The JOURNAL *of* GEOGRAPHY

Copyright 1941, by the National Council of Geography Teachers

VOLUME XL OCTOBER, 1941 NUMBER 7

RUBBER IN OUR WARRING WORLD

ADELBERT K. BOTTS AND LILLIAN PERLIN
State Teachers College, Trenton, New Jersey

Rubber is a vital product! Rubber is a strategic material! Strategic materials are those essential to national defense, for the supply of which in war dependence must be placed in whole, or in substantial part, on sources outside the continental limits of the United States; and for which strict conservation and distribution control measures will be necessary.

To obtain these strategic materials the Treasury Procurement Division was appropriated $47,500,000—one of the chief outlays on defense.

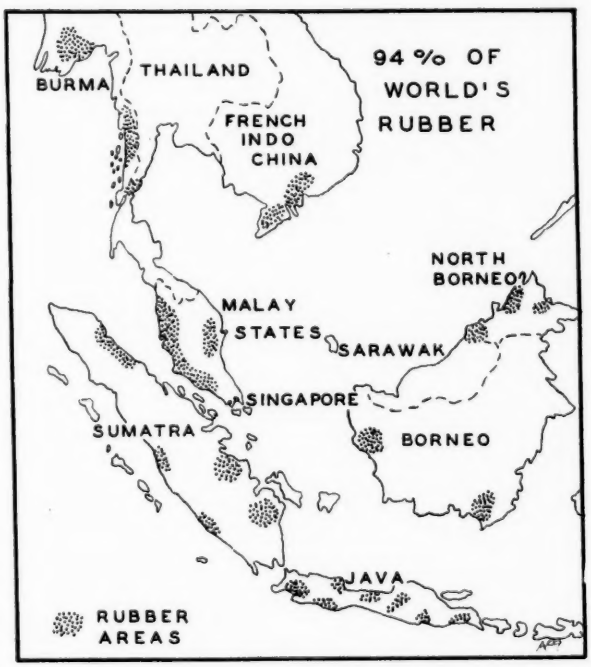


Fig. 1. Sources of the World's Rubber Supply

It is very difficult to separate government, politics, Great Britain, the war, the East Indies, and our South American neighbors when we consider the problems of rubber today. Some people are very optimistic about our supply of rubber, are very confident of the continued availability of it; others are very pessimistic when they consider the future of rubber.

Synthetics? It is doubtful that factories could be built fast enough to take care of our needs if the supply were suddenly cut off.

South America? Henry Ford has a $20,000,000 investment in his two South American Experimental Plantations—Fordlandia and Belterra. President Vargas' outlook on Mr. Ford's potential rubber supply is certainly favorable; but a purchasing agent in a large plant which manufactures cables, a man who has had years of experience on South American rubber plantations, said he wouldn't give thirty cents for Mr. Ford's investment down there, nor did

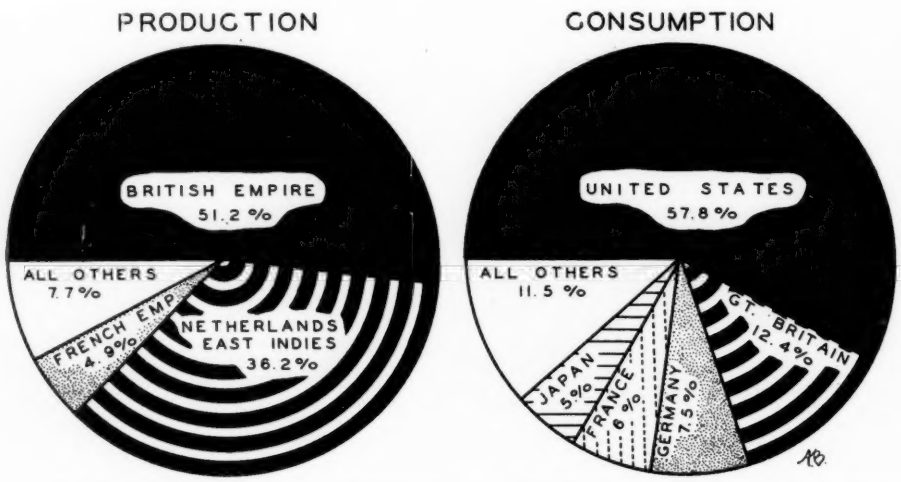


Fig. 2. Rubber production and consumption. This shows very clearly the dependence of the United States on the possessions of Great Britain and the Netherlands for its rubber supply. The chart helps us to understand why the United States is so keenly interested in the East Indies.

he think that Ford would get a return on his investment to the extent of thirty cents. None too enlightening were his views concerning the part synthetics would be able to play if we were faced with a rubber shortage.

Ninety-eight per cent of the rubber which the United States uses comes from the East Indies, from Malaya, from Cochin China. If war does travel to the Pacific, our supplies from the East will undoubtedly be impeded, for already there has been a shift in the trade routes thru which we receive our rubber. The conflict in the Mediterranean has shifted the percentage of rubber arrivals to the United States thru the Suez from over 90 per cent in 1933 to 15 per cent in 1939. In 1939, 65 per cent of the rubber was going around the Cape of Good Hope. The effect of this round-about route probably accounts for part of the seven cents per pound increase in rubber prices this last year.

W. S. Knudsen states that crude rubber stocks on hand are large enough to carry current civilian needs plus every possible defense demand for at least two years. An important manufacturing company in the East, whose government orders now constitute 60 per cent of its entire business, has, as was customary in past years, maintained a year's supply of rubber in reserve; nor does the company see the necessity of increasing this reserve. This can be

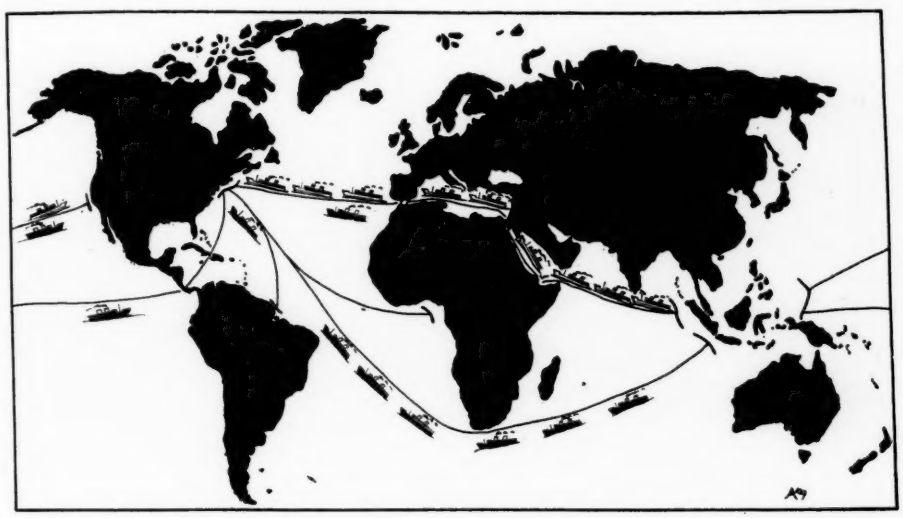


Fig. 3. War influences rubber shipments. In the map above each ship represents 10 per cent of the rubber imported into the United States in a given year. The white ships represent rubber shipments for 1933; the black ones for 1939. Altho the war did not start until late in 1939, the effect upon rubber shipping routes is very clearly indicated.

interpreted as a favorable sign, for if the shortage of rubber were imminent in the eyes of the government, surely the industries which were doing most of their work for defense would be the first to recognize the necessity for an increase in reserves.

Many authorities including Commissioner W. S. Knudsen, and J. D. Mooney, a vice-president of General Motors, and a famous authority on foreign trade state quite emphatically that no shortage of natural rubber can come upon us suddenly.

England's colonies supply 51.2 per cent of the world's production of rubber—in 1939 the United States consumed 57.5 per cent of the total natural rubber produced that year. Is the concentration of rubber plantations in the Far East another major reason for maintaining a large fleet in the Pacific?

It is well to be optimistic but suppose affairs in the Pacific stop

our rubber arrivals. From where can we obtain our necessary supply?

Suggestions: (1) synthetic rubber, (2) reclaimed rubber, (3) stockpiles, (4) East Indies under protection of the United States fleet.

SYNTHETIC RUBBER

November 4, 1940 *Time* magazine states that big time production of synthetic rubber would be at least two years away.

In *Business Week* we find the following excerpt: "Plant expansion goes on at top speed, especially in the war industries, with both Goodyear and du Pont building new plants for the production of synthetic rubber."

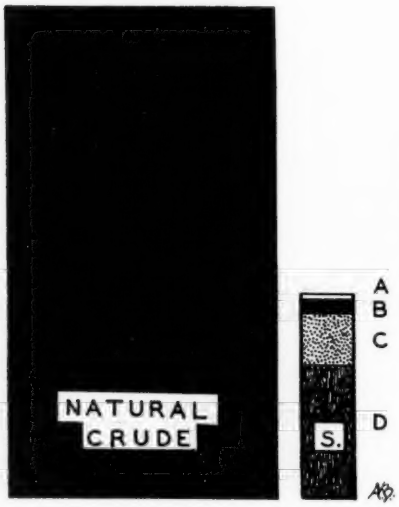


Fig. 4. Natural and synthetic rubber. Here we see the amount of synthetic rubber produced in a recent year compared with the amount of natural crude rubber produced in that same year. Three countries were important in the production of synthetic rubber: D represents the amount produced by U.S.S.R.; C the amount produced by Germany; B the amount produced by the United States; A that of all other countries. The total synthetic production equaled seven and one-half per cent of the world's production of natural rubber.

Forbes December 15, 1940 tells us that the synthetic rubber products are not yet quite as good as the natural product in most respects.

In *Scientific American,* November, 1940, producers of synthetic products boast that they can swing into large scale production within six to eight months, should the necessity arise.

We see how conflicting the opinions are. Uncertainty of price has held back plant expansion in the synthetic industries. Probably mass production of the synthetics would bring down the price. Until there is a definite shortage of rubber, and the price of all available rubber becomes very high, it is doubtful if plants will expand of their own free will. With the greater research that is

going on the price of synthetics will fall. Du Pont's Neoprene fell from $1.05 per pound to $0.65 per pound. But the price of crude rubber fluctuates between $0.19 and $0.24 per pound.

The United States Rubber Company tells us that the reason it has not engaged extensively in the production of synthetics is because of the low price of natural rubber. However, synthetic rubber is used where it can possibly be of better service.

June 15, 1940 *Business Week* states that all the 50,000 tons of crude rubber we use each month could be replaced by synthetics in eight months. We have now in this country about four months' supply of crude rubber on hand plus a five months' supply of finished and semi-finished rubber products.

Du Pont is leading the field of synthetic manufacturers, by producing now more than all that was manufactured in 1939. And the United States Defense Commission rejects the idea of waiting for the natural growth of this 'artificial' industry. Synthetic production is expected to show 10,000 to 12,000 tons annual capacity by the end of this year—to double it in 1941.

In the August 1940 issue of *Fortune* Okonite had an article entitled "Synthetics Are Not Substitutes." It explains that synthetics are used for their own merits: du Pont's Neoprene is resistant to all elements, oil, grease, and gas; Goodrich's Ameripol is used for better-wearing tires; Goodrich's Koroseal is non-inflammable, making it excellent material for insulations; Dow's Thiokol is oilproof, moisture-proof, ideal for insulated wires where oil swells; Goodyear's Chemigum is the newest in the synthetic market.

P. W. Litchfield, Goodyear's veteran chairman says "tires of the newly announced chemical rubber give superior performance to those made of German Buna and equal to those made of natural rubber. . . ." Chemigum uses the same production methods and equipment as natural rubber, and can be blended with natural rubber.

Thus we see the possibilities of and the support which synthetics can give us. By actual testing it is proved that the synthetics mentioned above are for certain purposes, actually better, more serviceable, than crude rubber. One of the managers in a plant using large quantities of rubber was of the opinion that with the greater research staff that was being maintained in face of present conditions, synthetics would continue to play an ever-increasing part in the 35,000 products made of rubber.

STOCKPILES

There is now the realization that stockpiles are not building up as might be expected. The stockpile goal is a two-year supply based upon the worst possible development—no possible imports.

When the defense production machine gets going full speed, the United States will be using between 800,000 and 900,000 tons of rubber a year. If necessary, probably half of this can be obtained by reclaiming. The Rubber Reserve Company, created by the RFC, expected to have 150,000 tons by the end of 1940, 180,000 tons more by July 1, 1941. Figuring on a supply of 45,000 tons from reclamation, 330,000 tons from the Rubber Reserve Company reserves, and 20,000 tons from synthetics, a total of 800,000 tons, we would still be 100,000 tons short of our maximum requirement. That amount, 100,000 tons, is almost one-fifth of a normal year's import.

OTHER SOURCES

Both government and industry have taken an interest in the possibilities of outside sources. Congress has appropriated $500,000 to enable the Secretary of Agriculture to conduct investigations directed toward development of rubber production in the Western Hemisphere. Private enterprise has invested millions of dollars in an attempt to insure and increase sources of rubber for the United States.

At present we get our jungle rubber from Brazil, our cultivated rubber from the Far East. In a certain company which manufactures cables, only jungle rubber is used because it is considered the toughest and believed to be the best obtainable. This jungle rubber is stronger and more durable than the cultivated product.

RUBBER SHORTAGE IN THE UNITED STATES

Just as rubber played a vital part in the defeat of the Germans in the last war, so could a shortage of rubber in our defense program spell disaster for us, if adequate supplies were not available.

In our factories, there has been a change in the type, the set-up and the amount of production.

To the United States rubber companies, the United States Government issues orders. These orders are classified as to A-1, or A-2. These orders show priority ratings. There are also orders under penalty. That is, if an armament or other vital order is not

completed by the time specified on the contract, a penalty is administered. If, for instance, a company gets an order from the Wright Airplane Plant, and the order for which the Wright Plant needs the material is a government order, the company will speed up if necessary. Government orders have priority ratings but many

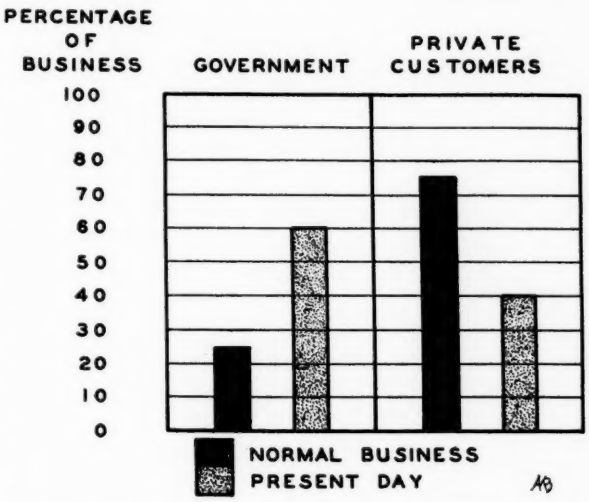


Fig. 5. Rubber and government priorities. This graph reflects the business of a large manufacturer of rubber insulated cables located in northern New Jersey. The changes can be explained in one of two ways: either many of the regular customers have been dropped; or the business has greatly expanded. In this particular case the former is true—regular customers have been dropped in order to comply with government orders.

companies, among them the United States Rubber Company, have not found it necessary to drop orders of their regular trade. On the other hand, there is an equally important company whose government orders have increased to such an extent that the trade of its regular customers has dropped from 75 per cent to 40 per cent of its entire business.

Many companies refuse to admit the extent of increase in their government orders; others are not able to. The manufacturing of belts for machines necessary in the building of airplanes for the government would not be considered a government order. Thus we can see that many of these indirect orders would not reveal themselves in the percentages of government orders for many companies. Fear of sabotage, fear of revealing business growth to competitors, and the nature of indirect government orders hinder an accurate appraisal of the true effects of government orders.

Conclusion

Disadvantages in Brazil for rubber plantations are many: living conditions must be cleaned up; the Amazon Basin has its rub-

ber trees hundreds of miles inland from the seacoast. There is a considerable lag between demand and production. It takes six to eight years to bring a plantation to bearing. Thus if planting takes place when rubber is scarce and in demand, the price may be very low and the necessity may be gone when the rubber is actually available.

The East Indies and Malaya have been successful because: (1) scientific knowledge and techniques of northwestern Europe have been applied to them; (2) political enforcement has made these regions safe for investment; (3) the focus of world ocean trade routes is in the midst of the Far East supplies.

True it is that synthetics have their merits, that they can play an important part in our civilization. However, the greatest contribution synthetics can hope to make to our requisites for the year, 900,000 tons, is 20,000 tons.

Our stockpile goal is not materializing as rapidly as we expected.

Reclamation of rubber in the United States will at the most net us 450,000—half of the necessary 900,000 tons.

Brazil cannot suddenly give us thriving rubber plantations.

Only with the aid of the East Indies can we possibly meet our necessary rubber demands.

Our greatest fear is the possibility that the totalitarian states may gain full control of the present major rubber sources. With Germany and Japan in control of Malaya and the East Indies we would be forced to deal with them on their own terms. The outcome of the contest between the totalitarian states and the rest of Europe, will be a major factor in the solution of our rubber problem, and vice versa.

AVIATION, A CHALLENGE TO HIGH SCHOOL GEOGRAPHY TEACHERS*

GUILBERT R. GRAHAM
Senior High School, Zanesville, Ohio

Youth takes Wings! Of that there can be little doubt. Thousands of young men and women take off daily from the runways of the nation's airports in an effort to master the art of flying.

The only guide needed for our normal travel about the earth upon commercial trade routes, or upon the great systems of highways is a railroad timetable, a steamship schedule, a bus schedule, or a road map. If while motoring, one becomes confused about which is the right way to go, he simply inquires of a gasoline station attendant. Because of the ease of finding our way about, we have neglected the science of locating points upon the surface of the earth and of directing our travel by the best route from point to point.

In flying, one is not obliged to follow hard surface roads or water bodies. Of course, he may follow some visible route such as a highway or railroad if there happens to be one along the way he wishes to go. In many cases these routes are not the shortest because of natural physical features which make construction difficult or impossible. Many new problems face the pilot. He may travel great distances without visual contact with landmarks, and obviously he cannot stop for directions. It is, therefore, necessary that the modern pilot be familiar with all the various means of avigation and that he develop speed and accuracy in their use.

There are so many relationships between aviation and geography that a great amount of time would be needed to discuss all of them, so we shall confine our consideration here to one problem, that of training pilots. A pilot needs certain information. Many sciences are involved. He must draw upon facts gathered thru his school years as well as from the accumulative experiences of life.

The demands for pilots and the opportunities for fliers are growing so rapidly that only a comparatively small number of men are available with sufficient training.

Safety is one of the first requirements. We may give our pilot a fool-proof plane. Surround him with all modern safety devices and every instrument for blind flying but he is ever in danger unless

* Abstract of a paper presented at the Baton Rouge meeting of the National Council of Geography Teachers, December, 1940.

he understands the many variable factors of weather and aviga-tion.

Must he learn only by the long, hazardous route of experience? Who is prepared to help him? What courses in our public schools are such that they could aid him in these fields? It is my opinion that in our high schools only the geography teacher can be of much assistance. Hence, the challenge which aviation throws to the high school geography teacher.

If geography teachers accept this challenge, and I feel sure they will, what are some of the specific things they can do? First, let's consider the field of avigation. The word navigation may be defined as directing upon the sea, while avigation means directing thru the air. In this field we as teachers are in position to be of great service to the generation of boys and girls now attending our classes. They should be aware of the difficulties involved in accurately locating a point upon the surface of this spherical earth and of the advantages to be derived from a standard grid system. We can aid them in understanding common nautical terms. We have always taught such terms as longitude, meridian, etc. but with the flying urge in a student's mind these words take on a more significant meaning. We should introduce to them some of the more commonly used map projections. Then, too, we can give them a broader conception of the earth's divisions from a navigational standpoint.

Maps and Charts

One of the first problems facing a pilot is the interpretation of maps and charts. Fortunately, there are many excellent maps and charts available. The need for special maps for safety in flying early became apparent. The Air Commerce Act of 1926 assigned the task of preparing such maps to the U. S. Coast and Geodetic Survey, with the instruction "to provide as adequate charts for the air navigation as it now provides for ocean navigation." Since the first maps appeared in 1930 many changes have been made. Certain items which should be included in a topographic map are now omitted in order not to obscure details of more importance to the navigator; other features are exaggerated beyond topographic justification, because of their landmark value. Thus, the airway maps gradually assumed the character of the nautical charts so essential for safety at sea. The designation of these highly specialized publi-

cations was changed to aeronautical charts. The following aeronautical charts are now published by the Coast and Geodetic Survey:

Sectional charts, of the Entire U. S., in 87 sheets, at a scale of 1:5,000,000.

Regional charts, to cover the whole country, in 17 sheets, at a scale of 1:1,000,000.

Radio direction finding charts of the entire U. S. in 6 sheets at a scale of 1:2,000,000.

Aeronautical Planning Chart of the U. S. (chart no. 3060 a) at a scale of 1:5,000,000.

Great Circle Chart of the U. S. (chart no. 3074) approximately 1:500,000.

Magnetic Chart of the U. S. (chart no. 3077) showing lines of equal magnetic variation, at a scale of 1:7,500,000.

The features shown on these charts may be divided into two groups:

1. Those necessary to a clear and accurate topographic representation.

2. Aeronautical data and information of interest chiefly for air navigation.

The topographic features may in turn be subdivided into three groups:

WATER—including streams, lakes, canals, swamps, and other bodies of water.

CULTURE—towns, cities, roads, railroads, and other works of man.

RELIEF—mountains, hills, valleys and unequalities of the land surface.

If I mention somewhat in detail the features of these charts it is for the purpose of acquainting teachers with these new maps which may be of value in classroom studies as well as in the cockpit far above the earth's surface.

The symbols employed to designate population centers give the students a clear conception of the size of towns and cities. Many features of interest in geographic studies are included, such as, forest ranger stations, lookout towers, oil and gas fields, mines, transmission power lines, dams, locks, bridges, race tracks, etc.

Many students go thru our schools without a knowledge of con-

tour maps. While these charts are not prepared primarily for topographic studies, they will be helpful in schools where the more detailed topographic sheets are unavailable.

Recognition of major relief forms is essential for the safe flight of planes. In emergencies, decisions must be based upon a thoro knowledge of land forms if disaster is to be avoided. Then, too, it seems to me that flying a plane would be so much more satisfying to one able to interpret the landscape beneath him. Perhaps such an idea would not be considered practical and does not deserve much emphasis, but I feel sure that such knowledge would be of value to pilots and would make flying more enjoyable for passengers.

Meteorology

Perhaps we can be of most service to our future aviators by giving them a thoro training in meteorology. A pilot should know many things concerning the earth and its enveloping atmosphere.

He needs a thoro understanding of the causes, effects, and indications of weather changes if he is to successfully complete his assigned flights; the executive needs a general knowledge of this subject if he is to appreciate the problems of his pilots; and the engineer must understand the stresses to be met by his ship if he is to develop his design to a successful completion. He should and does learn many things in his elementary school concerning earth science but often he is too immature to fully comprehend their significance.

Students will profit if they are taught to continually observe the daily weather. The interpretation of weather data should have more emphasis as the student progresses thru Junior and Senior high school. He should associate daily changes with the larger air movements of the earth and I think he should be given a glimpse into the new idea (now being popularized) concerning air masses.

How can we find time for so much weather study? Some teachers give a month or so to a rather complete unit on weather. Others find it more successful to spend a few minutes daily discussing and recording weather observations. Each plan has its advantages.

May I mention a few specific things which I feel would be helpful to a boy or girl when learning to fly? First, let's consider the wind. Local winds are quite important in taking off and landing. While airports are nearly always well equipped with wind indicators a student should have some rather accurate method of estimat-

ing wind velocity and directions in case of a forced landing. Some aviation schools do not teach the Beaufort Scale of wind velocity but it seems to me that this scale or a similar one might be very valuable. By means of simple diagrams, cartoons, charts or graphs a student can readily learn such a scale.

Some of the causes of wind deflection and wind changes should be pointed out.

Then, too, a student should be given an opportunity to observe wind instruments and to become skillful in observing and interpreting their meaning. Acquaintance with the operation of a barometer and the significance of its readings should be of great value. Time is required to learn these things. Wouldn't it be wiser to teach our students these skills while still in high school rather than for them to wait until they enter a flying school with its almost countless skills and principles to master?

A successful solution of the weather problem for aviation requires the services of many trained meteorologists for observers of surface and upper air conditions, for the technical staffs at terminal airports who prepare frequent maps, charts and diagrams, and for forecasters who analyze current weather data and issue short period forecasts for routes to be flown. We teachers in the high schools can do little toward the training of meteorologists but we might inspire some to study for such a career.

I'm sure that you will agree that a pilot needs to know a great deal about the weather. Now, what other qualified teachers have an opportunity to insert such instruction into their courses? They are limited, indeed. Does it not seem that we should assume this obligation and do all we can within the limits of our courses?

What phases of meteorology can we teach as a part of our present high school geography courses? I am convinced that our Junior and Senior high school students are able to grasp the principles involved in nearly all phases of weather observation and interpretation of conditions. Doubtless the theories involved in long-range forecasting and air mass analysis would present problems beyond the complete understanding of our students and outside the scope of our courses. However, our problem is one of developing an interest in and understanding of daily weather observation. Our physical geography unit on weather may well include such weather elements as temperature, dew point, visibility, cloud types, fogs, wind direction and velocity, barometric pressure, pressure change tendency, thunderstorms, hail, sleet, snow, and many others.

Many of these topics are considered in the introductory chapters of our economic geography textbooks. I feel that we can justify a change in our courses if necessary in order to meet the needs of our students in preparing them for a more successful life in the air in time of war or in time of peace.

There is a number of publications available which may be helpful in conducting a unit study on weather. In addition to many excellent textbooks the government publications, at little or no cost, present material resulting from recent investigation.

The following may be secured from the Supt. of Documents or from the Weather Bureau:

A chart of twenty cloud photographs with descriptive material —based on the International System of Classification of 1932 (post).

Miscellaneous Publication No. 114, U.S.D.A. "The Weather Bureau."

Weather Forecasting. Weather Bureau 972 U.S.D.A. Bul. 42.

Preparation and Use of Weather Maps at Sea. U.S.D.A. W.B. 9135. Circular R-W.B. 1151.

Instructions for Airway Meteorological Service. Circular N. Aerological Division (1939).

Special Pub. 197, U.S.D.C., Coast Geodetic Survey, "Practical Air Navigation."

Our students need more training in meteorology, physiography and navigation with special emphasis upon the application of such knowledge to the field of aviation. There is a wealth of material prepared for the express purpose of training aviators which may well be used to enrich our geography courses.

The call for pilots with better ground training is a direct challenge to the geography teachers of the nation. Let us prepare to contribute this constructive item in our national defense program.

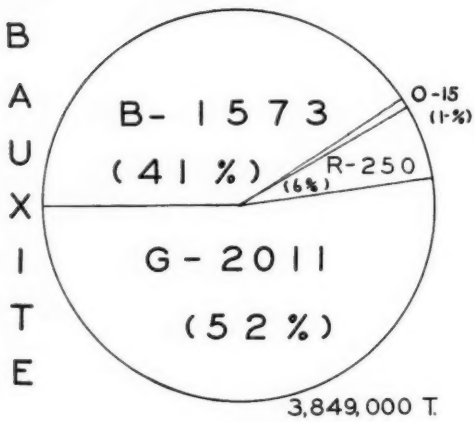
INDUSTRIAL STRENGTH OF BELLIGERENTS COMPARED

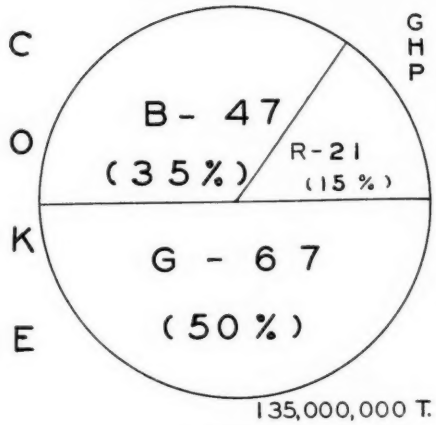
JOHN HELMBERGER AND GEORGE H. PRIMMER
State Teachers College, Duluth, Minn.

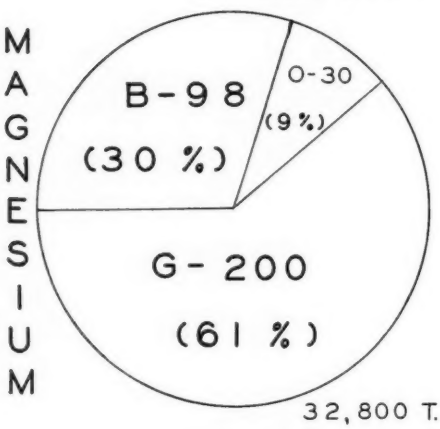
Since the present war began contradictory statements and predictions, of which many based on wishes rather than fact, have deluged the public. News commentators, on "good authority," declared that the German army couldn't possibly overcome the armies of both France and Poland, that Hitler "missed the bus" in attacking Norway, and that the Maginot line stood definitely invulnerable. On the above statements, as well as on many others, events proved the prognosticators drastically wrong. Until they were proven in error the public largely agreed with the commentators; the public learned but such learning, if continued, possibly becomes very expensive.

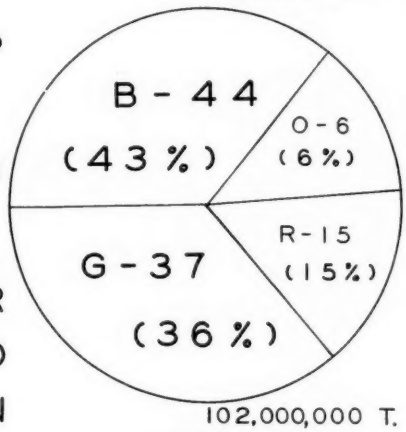
Faced with this record what should the average person think; or, more to the point, on what should he base his thinking? In trying to answer this question this paper proceeds from the notion that, in this age of technology, war, like every other large scale enterprise, operates with machinery. German military successes to date, would seem to stem from superior military machinery; probably the only way Britain and its allies, despite ideals and morale, can defeat Germany involves building more or superior military machinery. Both sides now build war machines as rapidly as possible, Germany to maintain the lead and Britain to attain it. While recognizing that ideals and morale remain important, probably one may maintain, justifiably, that who wins the war-machine race wins the war.

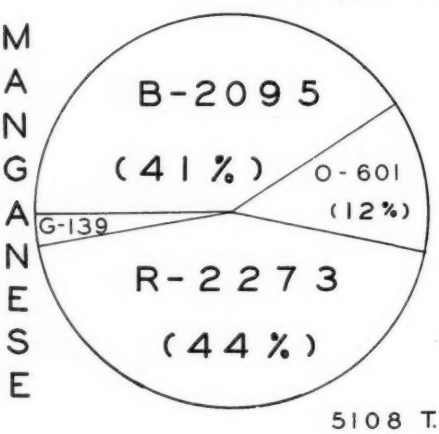
Who can build the more or the superior military machinery? No one can answer certainly but the accompanying graphs, showing production of the more important industrial raw materials, should help one in thinking rather than wishing about the situation. Explanation of the construction of the graphs makes for their easier interpretation. To suggest the industrial strength of the belligerents the graphs show the world divided into four parts: (1) Britain and its allies, (2) Germany and its allies plus occupied territory, (3) Russia, and (4) the rest of the world. For convenience "Britain and its allies" includes Australia, New Zealand, India, Malay, East Indies, South Africa, Canada, Irak, Iran, Trinidad, Egypt, Gold Coast, Cyprus, Guiana, and the United

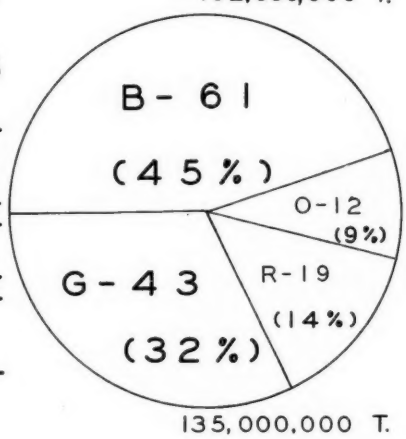




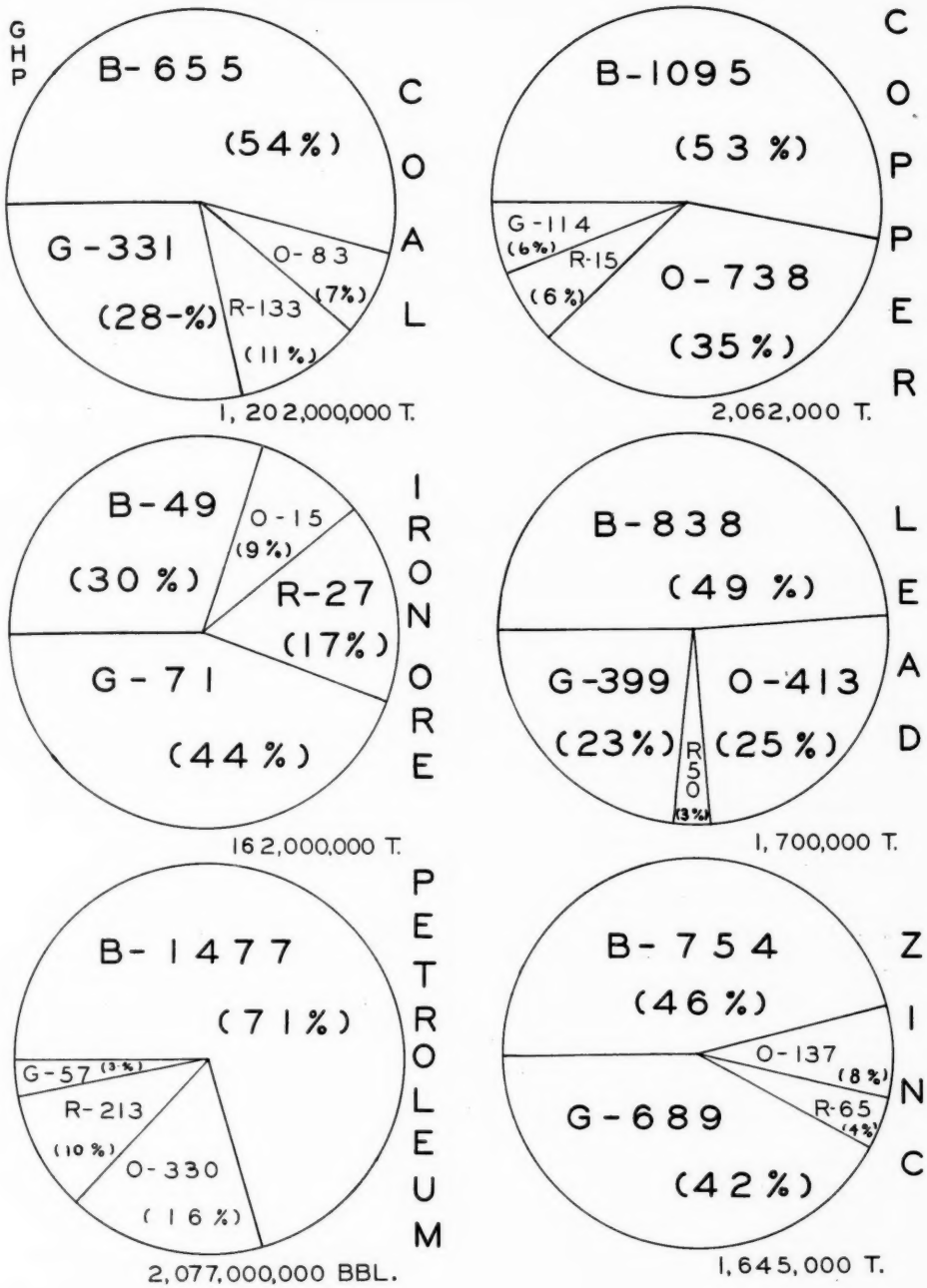








B - BRITAIN G = GERMANY



R = R U S S I A O = O T H E R S

States, and on the graphs shows as "Britain." "Germany" refers to pre-war Germany, Austria, Czechoslovakia, Poland, Norway, the Low Countries, France, Switzerland, Hungary, Rumania, Yugoslavia, Italy, and Sweden. Russia stands apart from the rest of the world to easily suggest what weight should attach to a Russian shift one way or the other. Figures state production for 1938 except the 1939 figures for petroleum, zinc, pig iron, and steel. Statistics, the most recent available that included all the countries, came from the *Minerals Yearbook* and the *Commerce Yearbook*. Recently released data of some warring countries, not considered authentic, as compared with slightly earlier, did not enter into calculations for making the graphs. Production shows in terms of ore except for lead and zinc, for which ore quantities were not readily available, and for coke, pig iron, and steel, chosen to indicate capacity for heavy industry.

United States production, for this one country alone, of iron ore and coke varied a great deal in the '30's. United States produced in 1937 some 73,000,000 tons of iron ore; but in 1938, the year of most data in this study, United States produced but some 29,000,000 tons of ore. For the same two years United States ovens turned out 48,000,000 and 29,000,000 tons, respectively, of coke. These facts one should consider when weighing industrial strength.

Britain's resources, the graphs show greater at a glance, but it labors under two big disadvantages: one, that most of its machines have to be transported a great distance and run the gauntlet of bombers and submarines before they can be brought into play against Germany, and the other, that most of its industry lies in United States not yet fully geared for war. Germany's resources show much less extensive than those of Britain; petroleum and alloy metals constitute its most serious deficiencies. Conceivably it hopes to supplement its oil with that from wells of Irak and Iran, and possibly from those of Russia, with or without consent of present owners. Even so Germany would draw oil from sources producing but one-fourth as much as those serving Britain. Germany could scarcely command more than one-fifth of the world oil supply without first gaining sea control.

Russia possesses the largest known resources of manganese, chief alloy metal. Russia easily could supply all the manganese needs of its own industries and those of Germany. Of the other alloy metals, nickel, chromium, vanadium, molybdenum, and tungsten, Germany controls but scant supplies; it substitutes an alloy of aluminum and magnesium for high grade nickel and chrome

steels. Germany likely has made many other substitutions but we lack definite information as to extent and degree of success. Greece, whose resources we must now deduct from "Britain" and add them to "Germany," contributes several alloy metals, chiefly chromium, to the Axis. But the changed status of Greece as well as the extension of German control over Bulgaria did not significantly affect the relative status of the industrial power of the belligerents as indicated by the accompanying graphs.

The Russo-German war developed during the progress of this study; since the Russian share of world production shows separately, the graphs still give the desired picture. In so far as Russia retains its industrial capacity it may be added to Britain's; in so far as it may be lost, without material damage, it may be combined with that of Germany.

SOCIALIZED GEOGRAPHY TESTS

MARY GALFORD
Clear Lake, Iowa

In an attempt to show the immediate value of the subject matter in seventh grade socialized geography, I use the following type of tests. They demonstrate to the pupils that the material contained in their texts and current events is not composed of isolated facts used only in the class room, but consists of information necessary to the well educated person, which is used daily in various activities concerned with real life situations.

A few samples are given to show the various situations in which knowledge gained in the class room is used in their other environment, in such activities as reading, listening, writing, talking, seeing and recall.

Purpose

To connect the subject matter with real life situations and to show the reasonableness of daily study of factual material.

To show the need of clear thinking, which results in clear speech and writing.

To show the necessity of accuracy in relating facts.

Test A

A boy who was visiting in New York, wrote a letter home to his sister. He was something of a tease, so he thought he would

make her test her knowledge, of which she liked to boast to him. Accordingly, he gave her a choice of words. Underline the correct word.

New York City
October 10, 1940.

Dear Sis:

Here I am in the greatest city in the U.S.A. Yesterday, we went to the Statue of Liberty, which was a gift to this country from (England-France-Spain-Germany) and is located on (Bedloe's-Ellis-Manhattan-Governor's) Island. We saw from a distance the place where immigrants land, which is (Staten-Manhattan-Ellis-Bedloe's) Island. We went on a bus trip thru the greatest Negro city in the world, called (Brooklyn-Queens-Bronx-Harlem). Altho there are more Negroes to the square mile than any other place on earth, most of the Negro population is still located in the (North-West-South-East). We drove thru Chinatown on our bus ride. Did you know that the Chinese first came to this country to (work on the Erie Canal-work in laundries-help build first trans-continental railroad-work on cotton plantations)? Our guide told us that a law was passed in 1883 called (Monroe Doctrine-Exclusion Act-Alien and Sedition Laws-Conservation Act) which was for the purpose of keeping Orientals from entering this country to live here and become citizens.

One day we went down to the harbor and saw big ships from all over the world. Some contained (rubber-nickel-cotton-beef), 98 per cent of which I was told came from (Brazil-Spain-Dutch East Indies-Japan). Other ships were loaded with (corn-machinery-tin-scrap iron) ready to sail to (Egypt-Japan-Gibraltar-Argentina), 90 per cent of which it gets from us for armament, but after the sixteenth of this month, no more can be shipped there, because of the (campaign-embargo-depression-monopoly) placed upon the export of this cargo.

Well, Sis, see you soon,

Bud.

TEST B

"Harry, Oh, Harry"

"Yes, mother. Did you want something?"

"Please go down in the basement and put some coal in the furnace."

As Harry shoveled coal, he thought of the report which he was to give to his class the next day, and he reviewed his notes, which

he planned to elaborate into a really fine talk. As usual, he was slightly hazy in his thinking and unless he made several corrections, he would certainly mis-inform his classmates on the subject of coal. Select the correct statements and let's hope that Harry does too.

1. The two chief kinds of coal are anthracite and bituminous.
2. I think this is anthracite because father said he got the best grade of Illinois coal.
3. The leading coal mining states are Pennsylvania, West Virginia, and let's see, oh yes, Illinois, Kentucky and Ohio.
4. We have three chief coal fields, the Appalachian, central and western.
5. Did the book say that we have more anthracite or bituminous? Oh, yes, I remember now, more anthracite.
6. Most of our anthracite is located in the great central field.
7. I think the United States is the greatest producer and user of coal in the world.
8. I mustn't forget to say that coal is our greatest source of power, that is, next to water, which produces hydro-electricity.
9. Coke is made from coal and is the best fuel for smelting purposes.
10. I'd better not shovel any more coal on the fire, because in about fifty years, it will all be gone.

Test C

Nellie went to the movies and was pleased when the news reel featured the Hawaiian Islands, located in the middle of the ———— Ocean. She watched to see if pictures were shown of the two chief exports ———— and ———— ————. Sure enough, fields of these crops and their cultivation were pictured. Scenes of the capital city, ———— also the strong naval base ———————— were shown. Both of these places are located on the island of ————————.

Test D

Henry's father was reading the evening paper and wanted more information about Gibraltar, which was playing such an important part in the war. He got an atlas and after studying it, he found out that it is on the ———————— coast of ———————— fifteen miles from the continent of ————————. He saw that it is between two large bodies of water, the ———————— on the east and the ———————— on the west. It is only a few miles from the mainland and the city of ————————.

A STUDY OF CHILDREN'S RESPONSES TO GEOGRAPHY PICTURES

KENNETH E. VAYETTE
Peoria, Illinois

IMPORTANCE OF PICTURES IN GEOGRAPHY TEXTBOOKS

No one can doubt that pictures play a very important part in the assembling of materials for textbooks at all grade levels in the social studies, as well as in other subjects. It has been found that from one-fifth to one-fourth of all geography text material is pictorial.[1] Because pictures occupy a considerable amount of the total page space of the best geography textbooks, the question may well be raised as to the amount of value which pictures have in the presentation and study of geographic material. The answer to this question can best be given by listing the following reasons for using pictures when teaching geography:[2]

1. Pupils require accurate imagery to aid in the formation of the ideas needed for geographic thinking.
2. Pupils require numerous ideas of regions beyond their experience. They must have clear concepts concerning both human adjustments and environmental conditions.
3. The picture is a valuable source of ideas concerning a region. If properly selected, it contributes to the imagery and understandings needed in geographic interpretation.
4. The picture is the best substitute for the actual landscape where human activity is shown in its natural setting.
5. The picture is an original source for obtaining geographic ideas. If properly used it is an economy in effort and time.

An analysis of the qualities that make up a good geography picture will show that many pictures included in geography texts, particularly of a few years ago, are not good pictures from the standpoint of imparting correct and definite geographic concepts. Pictures are not usually self-explanatory and, therefore, they require interpretation. The following standards for evaluating pictures should be used in teaching the social studies: (1) the pictures must be authentic, (2) pictures should be relevant to some essential

[1] Melbo, Irving R. and Waterman, Ivan R., Pictures in Geography Textbooks, *Elementary School Journal*, XXXVI (January, 1936), pp. 362-376.

[2] Gregory, William M., Abrams, Alfred W., and Peters, Rupert, Materials for Visual Instruction in Geography, *Thirty-Second Yearbook of the National Society for the Study of Education*, Public School Publishing Company, Bloomington, Illinois, p. 385, 1933.

truth which is to be taught, (3) pictures should direct attention to the most significant facts rather than obscure these facts by giving prominence to unimportant details, (4) the technical quality of pictures should be good, and (5) pictures should be attractive, interesting, and calculated to stimulate thought.[3]

The Reasons for Making This Study

Much has been written on the materials of visualization, their use in the classroom, and their effect upon teaching and learning; but little has been written on the actual number of correct concepts children derive from observing pictures, the nature of incorrect concepts or misunderstandings derived from pictures, and the probable causes of these wrong concepts. It is the writer's opinion that the authors and publishers of geography textbooks are too optimistic about the real value of the pictures included in their books even tho it is true that the better textbooks on the market today do include many excellent pictures with which to supplement the text.

Regardless of how excellent the pictures themselves are, it is still true that a great deal of the interpretation of the pictures depends upon the observer's background, mental set, environment, and imagination. The teacher must not assume that every child derives the same information and interpretation from a picture any more than that every child derives the same meaning from reading the same selection. It has been found that children use pictures more as a source of entertainment than as a source of information.[4] In reading pictures in connection with the social studies, children require careful guidance.

Assuming that the general quality of geography textbooks has improved during the last two decades and that many pictures included in them now are excellent, however good the textbook pictures may be, the problem of using them most effectively rests upon the teacher. Even good pictures do not always have inherent value in themselves alone. The best pictures can be partially or wholly meaningless for children unless the correct information presented in the pictures is carefully brought out. An observation of

[3] Horn, Ernest, Methods of Instruction in the Social Studies. Report of the Commission on the Social Studies, Part XV. Charles Scribner's Sons, New York, New York, pp. 379-380. 1937.

[4] Wiese, Edna L., A Case Study of Reading Comprehension Difficulties in Geography. Unpublished Master's thesis, State University of Iowa, Iowa City, Iowa, 1936.

many geography classes may lead one to believe that many teachers make little use of the pictures appearing in our geography books. The value of the pictures as instructional aids is left entirely to chance.

Many times inadequate or erroneous ideas may result in the mind of the child unless more than one picture is used in developing a concept. The importance given in the textbooks, especially of a few years ago, to pictures showing the unusual aspects or the natural phenomena of regions rather than pictures showing scenes typical of those regions, is the cause of many erroneous impressions about geographical regions. Teachers have a responsibility not only to point out significant data shown in the pictures being studied with each day's geography lesson, but to make the children feel a responsibility to be more observant of all textbook pictures. Perhaps this can best be done by making the study of pictures an integral part of the study of geography.

THE PURPOSE OF THIS STUDY

In this present study, the writer has attempted to discover what concepts children derive from an inspection of geography pictures which appear in textbooks regularly used in grades four thru seven, and what interpretations they give to the information presented in these pictures. A study of this kind must, of necessity, be in the nature of a survey, since the number of pictures to be examined in any one investigation must be limited. Definite questions which this study attempted to answer are:

1. With what degree of accuracy do children interpret geography textbook pictures?
2. As children progress from grade to grade, is there an increase in their ability to recognize geographical facts and to interpret geographical information contained in geography pictures?
3. What facts do children recognize in, and what interpretation do they give to, information contained in certain geography pictures?
4. What are some of the misconceptions children have about certain geography pictures?
5. What are the probable causes of the misconceptions children have about geographical facts and interpretations as indicated by their incorrect responses to questions about certain geography pictures?

THE PROCEDURE

For this investigation, the writer desired to use pictorial material from a geography textbook series for grades four thru seven that would be considered average or above average from the stand-

point of being well written, carefully illustrated, and widely used. One[5] of the series in current use was decided upon for the reasons that (1) it is generally considered to be well written and generously, but carefully, illustrated, (2) it is of recent publication, and (3) it is the series used in the school system in which the writer is employed, which perhaps was the determining factor in its selection.

Eight pictures from each of the four books in the series, making thirty-two pictures in all, were selected, keeping in mind the following criteria[6]:

1. The picture should be so clear and distinct that pupils and teacher need not guess as to what the picture attempts to convey.
2. There ought to be enough related ideas, either actual or implied, in a picture to provoke thought and reasoning.
3. The picture, in order to have high geographic quality, should show just a few distinct geographic features rather than attempt to convey a large number of details.
4. The picture should present geographic factors only, if possible.
5. The picture should stimulate the pupil to see possible relationships between natural environment and human activity.
6. The quality of a picture must be determined entirely upon its own merits and not upon the legend or description which might accompany the illustration.

Other criteria which influenced the selection were that each picture should lend itself readily to the asking of a number of questions, rather than just a few, and that the thirty-two pictures should represent a wide variety of subject matter. Following is a list of fifteen classifications of major types of scenes or activities: (1) native animals, (2) native life, (3) human habitations, (4) special buildings, (5) cities and city areas, (6) landscapes, (7) manufacturing processes, (8) manufacturing scenes, (9) agricultural processes, (10) agricultural scenes, (11) commerce activities, (12) fishing, (13) lumbering, (14) mining, and (15) miscellaneous.[7] Altho it was impossible, and even undesirable, to select pictures representing all of these scenes and activities, as many different types were selected as seemed practical for the scope of this study.

After the pictorial material was selected, an analysis of the con-

[5] McConnell, William R., Living in Different Lands, 1935. Living in the Americas, 1934. Living Across the Seas, 1934. The United States in the Modern World, 1934. Rand McNally and Company, Chicago, Ill.

[6] Cropper, Floyd A., An Experimental Evaluation of the Ability of Children to Interpret the Pictures Used in Elementary Textbooks of Geography, Journal of Geography, XXXIV (March, 1935), pp. 89-101.

[7] Melbo, Irving R. and Waterman, Ivan R., *op. cit.*, pp. 362-376.

cepts contained in each picture was made. A list of questions about each picture was then constructed to attempt to draw out the concepts contained in that picture. These questions asked for not only factual information, that is for information which is in the picture itself, but also, interpretative information, the answers to which depended upon the observer's educational background and reasoning ability. The questions asked were of two kinds: (1) those asking for factual information, apparent from a study of the picture, and including such questions as, "What kind of animals are these in the picture?", or "What crop is being raised here?"; and (2) those questions asking for the children's opinions about certain things, their interpretations of information given in the picture, and including such questions as, "What do you think these people might eat?", or "What do you think the temperature might be here in summer?"

To questions of this latter type there could scarcely be any one single answer. The writer was desirous of learning what the children's ideas were about questions of this kind rather than expecting any one exact response. Following questions of this type, there was almost always the correlative question: "Why do you think so?", or the statement, "Explain the above answer."

On many tests, more questions were asked than were intended to be used in the final analysis, as these additional questions were sometimes in the nature of interview questions to draw the child out in some explanation to a previous answer. Therefore, altho all of the questions have been analyzed for purposes of arriving at the reasons behind certain concepts, not all of the answers have been indicated, tabulated, or discussed in the completed study.

The completed tests were mimeographed, particular care being used to allow enough room after each question for the children to write as complete and lengthy answers or explanations as they might wish to make. When writing the answers to the questions, the children saw nothing but the pictures and the tests.

A combined recognition and immediate-recall type of question was used in constructing these tests for the reason that the writer wished the children's responses to be as nearly like a paper-and-pencil test, or an unprompted response to the pictures, as possible. A paper-and-pencil test, however, was impractical because of the limited amount of writing which some children do under such circumstances, and the lack of uniformity of items about which they

express themselves. The multiple-choice, true-false, and completion types of tests were not used for the reason that children often make satisfactory responses on these types of tests and yet show, in personal interview, very little knowledge of the ideas thus tested.[8] In a similar way, a child may answer a true-false item correctly and then show in a picture test that he knows nothing about the question.[9] Altho the writer would have liked to utilize the technique of the personal interview in collecting the responses for this study, circumstances made it impossible to do so. Therefore, he felt that the technique of the questions in the picture test best approximated the results of the personal interview. Because he is aware of the disadvantages of this method, he has taken these into consideration of the results.

ANALYSIS AND INTERPRETATION OF RESULTS

An analysis of the responses of the children to the questions they were asked about the thirty-two pictures is, in many cases, encouraging because of the excellence of the answers. However, in many cases it seems unbelievable that children could make such gross errors in reading information from the pictures. Many questions were left blank, or answered "I don't know." This was done most frequently by the lower grade children who had had less formal geography and who, also, were under the handicap of being least able to express themselves as they might wish to do. The number of unattempted questions decreased consistently from the fourth grade to the upper grades, there being almost no unattempted answers in the latter.

Many of the mistakes in the interpretation were due to lack of geographical background information, such as, a definite and exact knowledge of climate, temperature, rainfall, winds, elevation, and so on. Answers to questions about temperature in desert regions ranged from "5 below zero" to "175." A question about rainfall in the tropical rain forest revealed answers varying from "light," given by five pupils, to "100 to 150 feet of rainfall a year." The answers to questions about daytime desert temperature varied from "35 to 40 degrees" to "150 degrees."

[8] Herbers, Sister M. Benigna, Comprehension Difficulties in a Third Grade Reader, Master's Thesis, State University of Iowa, Iowa City, Iowa, 1935.

[9] Rhynsburger, Amelia H., A Study of Comprehension in Silent Reading, Master's Thesis, State University of Iowa, Iowa City, Iowa, 1930.

Similarly, another cause of mistakes is due to lack of knowledge of geographical facts, such as, location of and information about continents, oceans, countries, regions, states, rivers, deserts, mountains, and so on. Children confused Hudson Bay with Hudson River, Austria with Australia, Pittsburgh with New York, and located Switzerland as being on the continents of South America, Australia, North America, Asia, and Africa. A desert canyon was located in the "states" of Kentucky, Illinois, Kansas, Mexico, Australia, Asia, North America, South America, and Little America. Men were seining for salmon not only on the Columbia River, but also on the Mississippi, St. Lawrence, Hudson, Mohawk, Ohio, and Colorado rivers. New York City was confused with Boston, New Orleans, Chicago, Buffalo, Milwaukee, Grand Rapids, and Paris. The latter was said to be "on the Atlantic Ocean."

The impression upon children's minds of generalizations about geographical facts seems to be the cause of many errors in responses. Responses about arctic scenes indicate that some children believe it is always extremely cold there and that summer days are "six months long" and winter nights equally long. Some said deserts were dry because they were "near" or "by" the equator, and that snow, even when on mountain peaks, was due to "getting toward the north" and "so far away from the equator." Other erroneous beliefs frequently encountered were that all dark-skinned peoples are "Africans" or "Negroes" and that Americans are the "most civilized people in the world."

Another type of error frequently made is due to the use of indefinite words, terms, and expressions, by textbook writers, teachers, and pupils, especially in matters of comparison. These mistakes occur most commonly in questions about temperature, rainfall, distance, size, height, and so on. They involve responses to which the answers may be "big," "little," "hot," "cold," "high," "low," "long," "short," "heavy," "light," and other words involving relative values. To a question about the temperature on the desert, such indefinite and varied answers as "cold," "real hot," and "the highest" were given. A question about the amount of rainfall on a farm in the North Central States was answered correctly with the word "medium" by eighteen out of thirty children, whereas five said it was "light" and seven said it was "heavy." When asked how far from their own city they might see such a farm, the children's answers varied from "one mile" to "about 500," altho

their city is located in one of the North Central States and is surrounded by farms such as those shown in the picture. Other answers were "near the Mississippi" and "on the other side of Bartonville." The use of words such as "high," "low," "cold," "hot," and others is not wrong in itself. These words, with an evident correct understanding of them, often answered a question correctly. However, in many cases answers to subsequent questions proved that the children had very faulty notions of what they meant in previous answers. An illustration of this is the child's explanation of the temperature on the desert as being "35 or 40 degrees," because "it is very hot there."

Many errors in the responses may be attributed to misconceptions derived from verbalistic learning. The children have heard, repeated, and learned answers which are verbally correct but which they do not thoroly understand. Because children can repeat glibly the correct response, teachers are prone to believe that they have a thoro and exact understanding of the questions they have answered. Some of the wrong concepts due to verbalistic learning have become evident from answers to such questions in the tests as "Why do you think so?" and "Why did you give the above answer?" Fourteen children could name the "tower-like structure built next to the barns" as "silos," altho only two gave satisfactory explanations as to their use. Other replies were "wall house," "hay lofts," "corn bin," "elevator," "water tanks"; and they were for the purpose of "keeping hay in," "putting water in," and "storing the wheat in." Some of the reasons given for the native Africans carrying loads of boxes and baskets on their heads were: "to keep the sun out of their eyes," "because they think it isn't so heavy," and "because they got flat heads."

The failure to arrive at correct answers to questions about a picture from information given in the picture is a serious obstacle to overcome if pictures are to become more meaningful. In a picture showing boats in a lock, answers to the question asking what the difference in water levels was, varied from "one foot" to "one hundred," altho an estimate of between eighteen and twenty-five feet could easily be obtained by comparing the distance with men standing near the lock gates. In a picture of an orchard, obviously in a region of insufficient rainfall, a number of children explained the water in the irrigation ditches by saying that "the rainfall was heavy" because the "water was standing on the ground."

Another reason for misinterpretation was the confusion in the child's mind of the picture being examined with a country or subject recently or currently studied by the child, or with experiences close to the child's interest. Some children answered questions about several pictures consistently as tho the pictures dealt with Japan, Australia, or Ethiopia, countries they had studied shortly before the tests were given. Some children interpreted certain pictures in terms of local and personal interests, as the child did who said that the Pittsburgh factory was in his own city. The Hudson and East rivers were both called the Illinois River, and the locks at the Soo were mistaken for the locks at the Starved Rock State Park, probably visited recently by the child who gave that answer.

A last reason for the mistakes children make in interpreting pictures, and probably one of the most important, is that children have not been trained to use pictures properly; that is, to get the maximum amount of information from pictures. Very few geography courses include specific directions for the study of pictures. Such a course, or series of drills, should teach children, as well as teachers, to read and interpret significant information contained in geography pictures. If geography courses of study included such a systematic study of pictures, we would not find so many children making some of the mistakes found in this study. One child said that there was little rainfall in a region of irrigation because "the ground is dry," altho water was standing in puddles on the ground. Children should be taught to recognize the element of perspective in pictures. Only eleven children out of thirty recognized correctly the highest peak in a mountain range, most of the eleven giving as the reason, which was correct, "because it was snow-covered." Other lower, but closer, peaks were chosen because "it shows the highest in the picture" and because "it goes the closest to the top." A still lower slope of a mountain extending out of the picture at one side was selected by several because "you can't see the top" and "it is not all in the picture." A dam built across a river in a manufacturing town is described as "a little sidewalk across the river." The buildings in this same picture and the steel mills near Pittsburgh were built near the river so that "in case the buildings caught fire, they would be near the water," altho the former is obviously for the purpose of water power, and the latter for water transportation. Other mistakes made because it was perhaps assumed that children understood more than they apparently do were

that boats in the locks at the Soo were there for the purpose of being "fixed," "worked on," "cleaned," "painted," "loaded or unloaded," or "being let into the ocean." The men bending over a desert well were "planting corn." Another child called the men "pirates" and said they were "hiding money."

Only one child out of the hundred and twenty children tested, and on only one picture, complained that the picture was not clear to him. In reply to the question about the duty of the man at the left of the picture, he wrote, "I can't see very well." The writer felt that the criticism was just because that part of the picture, being thrown in shadow, was dark.

The tests were analyzed with the objective of answering the original questions pertaining to the problem. These questions and the writer's conclusions, based on results obtained and observations made in this study, follow:

1. With what degree of accuracy do children interpret geography textbook pictures?

From an analysis of the responses which lent themselves to an exact scoring, it was found that all children participating in the study answered correctly 66 per cent, or about two-thirds, of both the factual and interpretative questions. The factual questions were answered with a greater degree of accuracy than the interpretative, the former being answered 70 per cent correctly, the latter 61 per cent correctly.

2. As children progress from grade to grade, is there an increase in their ability to recognize geographical facts and interpret geographical information contained in geography pictures?

There was a continuous improvement in the percentages of correct responses to both factual and interpretative questions from group to group, with the exception that the group using the fifth grade pictures made consistently lower scores than the group using the fourth grade pictures. This may be attributed in some degree to the fact that the quality of the fifth grade pictures seemed to be somewhat inferior to the quality of the fourth grade pictures. The percentages of correct responses for the four grade levels are: Fourth grade group, 62 per cent; Fifth grade group, 59 per cent; Sixth grade group, 70 per cent; Seventh grade group, 73 per cent.

3. What facts do children recognize in, and what interpretations do they give to, information contained in certain geography pictures?

The answer to this question has been given in part in the preceding discussion.

4. What are some of the misconceptions children have about certain geography pictures?

This question, too, has been answered in part in the foregoing discussion.

5. What are the probable causes of the misconceptions children have about geographical facts and interpretations as indicated by their incorrect responses to questions about certain geography pictures?

The following reasons seemed to the writer to be the causes of some of the misunderstandings of factual and interpretative information about geography pictures made by children as observed in this study: (1) lack of geographical background information, such as, a definite and exact knowledge of temperature, rainfall, winds, elevation, vegetation, and so on; (2) lack of knowledge of geographical facts, such as, location of and information about continents, oceans, countries, regions, states, rivers, deserts, mountains, and so on; (3) the impressing upon children's minds of generalizations about geographical facts, such as, that it is always hot at the equator, or that arctic nights are six months long; (4) the prevalent use by textbooks, teachers, and pupils of indefinite words, terms, and expressions, especially in matters of comparison, in talking of geographical facts, such as, big, little, hot, cold, high, low, and so on; (5) the practice of verbalistic learning without real understanding of the subject; (6) the failure to arrive at correct answers to questions about a picture by reasoning from information given in the picture; (7) the giving of imaginative and fictitious responses to satisfy the requirements of answering the questions or to please the teacher or examiner; (8) the confusion of the picture under examination with a country or subject recently or currently studied by the children, or with experiences close to the child's interest; and (9) the lack of training in the use of pictures in order to enable children to recognize and to be able to interpret the maximum amount of information that is contained in good geography pictures.

SUMMARY AND CONCLUSIONS

The writer believes that the responsibility of making the most valuable use of the pictures found in the better geography textbooks now being published rests upon the teacher. Geography text-

books contain a wealth of pictorial material which has been painstakingly selected, carefully edited, and skillfully integrated with the text. Heretofore, pictures have been used largely for the purpose of stimulating interest, whereas their principal purpose should be the stimulation of thinking and study. Too often, perhaps, it has been assumed that because every child can see the picture, every child understands it and interprets it in the same way, and hence it needs no further explanation or interpretation than a cursory glance. Pictures which are typical of geographic features, rather than those which show unusual phenomena, should be stressed. Many times, more than one picture is required to develop adequately a geographic concept. Only by careful teaching of the information contained in geography pictures can children be trained to read correctly for themselves the maximum information inherent in a good geography picture.

A STATE COUNCIL OF GEOGRAPHY TEACHERS WITH A FINE RECORD

The following information is taken from one of the state council reports recently received by the Secretary of the National Council.

The Nebraska State Council of Geography Teachers, organized in 1916, and active thruout the intervening years, is working at present under the chairmanship of Walter Hellwege of Concordia College, Seward, Nebraska. Below are quoted some of the questions sent out by Secretary Barton, together with the Nebraska replies.

Question: What is the best thing your council has done in the last year or two?

"The Nebraska Council of Geography Teachers has centered its attention on securing for the *Bulletin* more interesting and helpful material for the rural and elementary teacher. The council was able to secure the cooperation of a committee of teachers in some four counties to prepare materials for four issues of the *Bulletin*. The officers of the State Council and the resources of the University of Nebraska were used in giving original directions and in editing the materials produced by the several cooperating committees.

"The *Bulletin* was formerly issued to interested subscribers at a price of 25 cents per year and reached from 50 to 125 people only. By making the *Bulletin* available (at cost of mimeographing, paper, and transportation) to county superintendents who wished to distribute it to all their teachers, the Council was able this year to distribute approximately 1500 copies of each of the four bulletins in the state."

Question: What is your council planning to do in the next year or two?

"Next year the Council is planning to have materials for high school produced by individuals or groups in the several sections of the state, following a plan similar to the one used this year in developing the rural elementary school bulletins. For example, a teaching unit on the potato industry in Nebraska and the sugar beet industry in Nebraska would be prepared by teachers in the North Platte Valley, where potatoes and sugar beets are grown in abundance. In a bulletin on the fruit industry in Nebraska, materials will be prepared by some teachers in the southeast section of the state, where fruit is an important crop. The facilities of the curriculum laboratory in the Teachers College, University of Nebraska, will be used to help organize, edit, and distribute these materials."

The Nebraska Council sends back these queries: What are other state councils doing with their bulletin? What activities, other than publishing a bulletin, do other state councils sponsor? What is the relation of state councils to the National Council?

ALICE FOSTER, *President*

A LETTER TO STATE COUNCILS OF GEOGRAPHY TEACHERS

TO CHAIRMAN OF STATE COUNCILS:

The National Council requests your participation in an experimental project aiming to bring about closer co-operation between state and national groups of geography teachers. One session of the 1942-43 meeting of the National Council of Geography Teachers will be opened to papers submitted by state councils. Since the National Council hopes by this means to become acquainted with talented younger members of the state and local groups, the contest is open only to people who have not presented papers at National Council meetings previously.

Following is a statement of what we ask you to do if you approve the idea presented above.

1. Arrange for scouts to represent your council in ferreting out exceptionally good papers presented between July 1, 1941 and June 30, 1942 (a) at your annual meeting, (b) at academy of science meetings in your state, (c) at local teachers' meetings, (d) at your state teachers' meeting, or (e) on chapter programs of Gamma Theta Upsilon.
2. Let a committee of your state council select the best three of these papers.
3. Submit this group of *best papers* to a committee of the National Council before August 15, 1942, in order that the best four or five papers may be invited for presentation at the 1942-43 meeting of the National Council. Early in 1942 the President of the National Council will announce thru the JOURNAL OF GEOGRAPHY specific directions for submitting the winning papers from each state.

With this request go the best wishes of the National Council

of Geography Teachers for a large measure of success in the work of your state groups.

Cordially yours,

ALICE FOSTER, *President*
FLOYD F. CUNNINGHAM, *First Vice-President*
THOMAS F. BARTON, *Secretary*

THE NATIONAL COUNCIL AT BOSTON

The National Council of Geography Teachers followed its usual practice of taking part in the summer convention of the National Education Association. Because of serious illness, Mrs. Erna Grassmuck Gilland was unable to handle the duties of the Educational Relations chairmanship, a responsibility which she has carried enthusiastically since 1926. Robert M. Brown, graciously taking up the duties of acting chairman at short notice, planned a geography program for Tuesday afternoon, July 1, and collaborated with a committee of the National Council for the Social Studies in a joint session for Wednesday afternoon. Mr. Brown wrote as follows, under date of July 8.

I am reporting that the meetings in Boston were on the whole successful. The Tuesday afternoon meeting of the National Council of Geography Teachers was well attended and the talks were interesting. But it was hot.

The joint meeting the next afternoon had a large attendance and again the talks were worth while, and again it was hot.

The following papers were presented at the two sessions.

First Session, July 1, 1941

Presiding, Leonard O. Packard, Boston Teachers College
"Geographic Limitations to Russia's Economic Growth,"
W. E. Ekblaw, Clark University, Worcester, Mass.
"The Children's Museum—The Last Word in Visual Aid,"
Mrs. Anne Ohmstead Peet, Children's Museum, Jamaica Plain, Mass.
"Opinions Regarding Correlation of the Social Studies,"
Anson B. Handy, President State Teachers College, Hyannis, Mass.
"Our Atlantic Outposts,"
Earl B. Shaw, State Teachers College, Worcester, Mass.

Joint Session with the National Council for the Social Studies
Wednesday, July 2, 1941

Presiding, Robert M. Brown, West Barrington, R.I.
"Getting Democracy into the Social Studies Classroom,"
Mabel B. Casner, West Haven, Conn.

"The Place of Geography in the Social Studies Program,"
Kathryn Schorrenburg, State Teachers College, Towson, Md.
"The People of South America,"
Preston E. James, University of Michigan, Ann Arbor, Mich.

EDITORIAL NOTES AND NEWS

A shortage of magnesium need never trouble the world, since there is an inexhaustible supply in the ocean. Dr. R. H. Harrington of the General Electric Research Laboratory states that "Even tho the concentration of magnesium in sea water is quite low, there are about four and a half million tons of magnesium in a cubic mile of sea water. Thus only one cubic mile of sea water will furnish 90 million pounds of magnesium metal each year for 100 years!" The problem is to get the magnesium out of the ocean water. Manufacturing plants are now in operation and others are under construction. The probable production for 1941 will be 30,000,000 pounds, and 90,000,000 pounds in 1942. The figures stand in striking contrast to about 7,000,000 pounds produced in 1939 by former methods of extraction.

In the September issue of *Business Education World* appears the first of a series of articles based on the United States Census of 1940. The series is prepared by Douglas C. Ridgley and J. Sullivan Gibson. The September article gives a "General Survey of Population, 1607-1940." Later articles will deal with the growth of the United States in area and population, the distribution of population in 1940 by divisions and states, the 92 cities having a population of 100,000 inhabitants or more in 1940, and other topics of interest to geography teachers. Pictures, maps, and graphs illustrate the articles. Teachers of geography will find this series of articles of real practical value. We are always pleased to learn of able geographers who are contributing to non-geographic magazines, and to learn of magazines that are interested in geographic articles.

The National Council for the Social Studies will meet this year at Indianapolis. The three-day convention will begin on Thanksgiving Day, November 20. Anyone interested in teaching the social studies in elementary and secondary schools is invited to attend.

Supplementing the usual program of addresses, panel discussions, and visual-aids demonstrations, there will be two novel features this year: (1) seventeen simultaneous seminar study groups on practical classroom problems in teaching the social studies; and (2) a symposium on citizenship education sponsored jointly by the National Council and the National Foundation for Education in American Citizenship.

David Cushman Coyle, author of *America* and numerous other widely read books, will address a general session on the subject of strengthening national morale. Paul Hanna, Ralph Tyler, Fremont P. Wirth, Edgar B. Wesley, and Erling M. Hunt are among the other speakers. Attention will also be focused on the presentation and appraisal of the newly published Twelfth Yearbook of the Council, "The Social Studies in the Elementary School."

The National Geographic Society, of Washington, D.C. in October, resumes publication of its illustrated *Geographic School Bulletin*. These bulletins are issued weekly for 30 weeks, five bulletins to the weekly set. They embody timely information on boundary changes, exploration, new industries and economic developments, and news of places and peoples over the world. The cost is nominal.

L. LE MAR STEPHAN succeeds Ruben L. Parson as head of the Department of Geography at the Troy, Alabama, State Teachers College. Mr. Stephan was formerly instructor in geography at Kent State University, Ohio.

Those desiring information on the Soviet Union may wish to contact the American Russian Institute, 56 West 45th Street, New York. The Institute was founded in 1926 and maintains a library and information service, publishes the bi-monthly *American Review* on the Soviet Union, has a number of exhibits available, and arranges language courses, lectures, dinners, and film showings.

Do your students wish to correspond with students of other lands? If so, the following agencies, listed in *School Life*, may give you addresses that will promote letter friendships: Mrs. Alice Thornton, American Junior Red Cross, Washington, D.C.; R. C. Mishek, Waseca High School, Student Letter Exchange, Waseca, Minnesota; International Friendship League, Inc., 41 Mount Vernon Street, Boston, Massachusetts; International Students Society, Vancouver, Washington; A. J. Roehm, Director of National Bureau of Education Correspondence, George Peabody College for Teachers, Nashville, Tennessee; Miss Marinora Wilson, secretary of Students Forum on International Relations, 406 Sutter Street, San Francisco, California; Junior Department, *Christian Science Monitor*, Boston, Massachusetts; Young Folk's Page, *The Cleveland Press*, Cleveland, Ohio; and Dr. John Patterson, senior specialist in Inter-American Educational Relations, U. S. Office of Education, Washington, D.C.

The Washington National Airport, which was opened in June for public service, is our first federally owned and federally operated commercial airport. It has 729 acres in the field, and its main runway, north and south in line with the prevailing winds, is a mile and a quarter long. A pilot can land from any one of eight directions at a gliding angle of 40 to 1. A battery of 20 teletype machines sends and reports weather and traffic messages, while a "flight progress" board reveals where all planes are in the airport's control area at any given time. Spectators are afforded both outside and indoor space for seeing the airport in action without interfering with its services. The site is three and a half miles from downtown Washington, on the Mount Vernon Highway, at Gravelly Point, part of it being made of material dredged from the river which it adjoins.

The local chapter of Gamma Theta Upsilon of State Teachers College, Tempe, Arizona, offers as a prize to the graduating geography major who has the highest scholarship record in geography, a two years membership in the National Council of Geography Teachers. This year's award goes to Richard Dukelow.

The Department of Education of the American Museum of Natural History has just made available to schools and colleges the first series of Kodachrome lantern slides to be offered by any institution. The "Evolution of the Horse" is the title of this set of 25 slides, 2 x 2 inch size. The Story of the Dinosaur and Ancient Man will soon be available.

The widespread belief that the oyster is fit to eat only during R-months is apparently being relegated to superstition, according to Louisiana oyster experts. Some of the opposition to oyster eating in warm months has been due to the fact that at that season oysters undergo certain biological changes that produce a milky appearance in the open oyster. Since all oysters in a bed do not undergo this change at the same time, experienced oyster fishers, who can tell at sight which oysters are milk-free, can easily throw those unsuited to use unharmed into the water. Another obstacle to delivery of fresh oysters for summer enjoyment has been removed by modern cooling and fast transportation.

New weather map symbols for weather elements are to be used on the United States daily weather maps. A significant addition will be the indications of air masses and the fronts where they meet. The time of observations will be earlier, to facilitate an earlier distribution of the map to the public. The United States Weather Bureau has recently celebrated its 50th year of continuous service to the Government and public. During the last three years the Bureau of Mines has supplied helium from its plant in Amarillo, Texas, for use in obtaining air-mass analyses. The helium is used to inflate balloons, one type of which is used to get the ceiling or height of clouds; a second, to get the direction and velocity of the wind at various altitudes; and a third type which carries the radiosonde automatically transmits signals giving temperature, humidity, and air pressure at given altitudes.

GEOGRAPHICAL PUBLICATIONS

David R. Jenkins. **Growth and Decline of Agricultural Villages.** 95 pp. Bureau of Publications, Teachers College, Columbia University, New York, 1940. $1.60.

The villages of this study are the service station villages of a farming community, and are described as containing between 250 and 2,500 people with farm lands on all sides and functioning as social and trade centers for the farm people. Villages of this type in the United States number approximately 9,000, and since all could not be visited, a sampling method was used in the study and the conclusions are based on a study of the samples. After stating the conditions of the problem the author discusses the causes of the growth or decline of the sampled communities. Changes in this type of village, he finds, are due to migration largely, and not to changes in vital rates; and migration is affected primarily by the trade with the surrounding country, and in the next instance by changes in industrial establishments. Whatever the change, there are certain definite sociological consequences for the family and for the schools, and these are carefully set forth in two chapters.

The study is an important one, it is a restatement with fresh discussion of a problem long recognized, and any student interested in studies of small communities can find some challenging facts in this dissertation. The volume covers ninety pages but if the reader's time seems precious, the author has appended on pages 88-90 an excellent and inclusive summary of his main conclusions, and these will give an adequate knowledge of the scope of the book.

ROBERT M. BROWN

Rhode Island College of Education

Clarence F. Jones, in collaboration with Gordon G. Darkenwald. **Economic Geography.** 390 pictures, 400 maps and charts, 629 pages. The Macmillan Company, New York. 1941. $4.25

For those who have studied economic geography under the authors, this textbook needs no commendation, for it is an outgrowth of the research, lectures, and discussions directed by the senior author over a period of eighteen years, and by the collaborator over a period of six years. Intended as an introductory book, this text offers in readable and attractive form a systematic survey of the material that constitutes the subject matter of economic geography. It is written in a simple, accurate, yet vivid style, and it brings to the growing field of textbooks in economic geography a much needed freshness and vitality. Further, the book contains a wealth of material that has not been assembled elsewhere in such concise form.

The authors make of economic geography a study of the productive occupations and the distribution of their output in relation to physical and economic conditions. The material is organized, therefore, around types of activities or industries: hunting, fishing, gathering of forest products, lumbering, grazing, farming, mining, manufacturing, transportation, and trade. Particular emphasis is given to types of farming.

This basic organization provides a framework around which even the more mature student might build a working knowledge of the production and distribution of the chief commercial products of the world. Such an organization, so well illustrated in the chapter on "Mediterranean Agriculture," not only gives the student a knowledge of particular systems of farming, but it also gives him an incidental understanding of regional activities and a detailed knowledge of the commodities produced in the various regions. In addition it aids him in formulating general principles concerning the facts of the commercial world in which he lives, principles which will remain with him long after the details have been forgotten.

The textual material is well illustrated. The distribution of each commodity is presented on carefully drawn maps, and the series of bar grafs which show the production and exportation of various commodities by counties is especially noteworthy. These grafs enable the student to obtain quickly a knowledge of the outstanding producing regions of the world. The pictures, likewise, are well chosen.

Teachers will do well to examine this text for use in their college classes, both as a basis for a systematic presentation of the facts of economic geography, and as a basis for a geographic approach to the solution of world problems.

CLYDE F. KOHN

Mississippi State College for Women

Physical and Economic Geography of Oregon. 319 pp., maps, diagrs., ills., bibliogrs., index. Oregon State Board of High Education, Eugene, 1940. $2.00 paper.

A corps of authors, under the direction of Professor Warren D. Smith, has prepared this volume which claims only that it is a "compendium of basic information concerning the physical background and natural resources of the state of Oregon." The compilation is presented in the three main divisions which are familiar to all geographical students: Natural Background, The People, and Resources and Industries. The result is a veritable mine of information and one gains the distinct impression that the many veins of this mine could have been made richer had the several authors been under no necessity of severely abridging their accounts. Sacrifices made necessary by the condensation of textual matter is partly offset by a wealth of illustrations including diagrammatic views of natural regions as well as a variety of legible grafs, cartograms and pictures. Each chapter includes a comprehensive list of references suitable for further study. Anyone

wishing a straight-forward description of Oregon's geography should commence with this unpretentious work. Recommended for supplementary reading is *Men and Resources, A Study of Economic Opportunity in the Pacific Northwest,* recently published by the Northwest Regional Council, Portland (81 pp.). The textual treatment of Men and Resources is perhaps oversimplified for geographical readers but the many grafs and maps of population, water storage, farming areas an areas of potential settlement will be found instructive or provocative of thought.

RALPH H. BROWN

University of Minnesota

Paul R. Hanna, I. James Quillen and Gladys L. Potter. **Ten Communities.** 512 pp. 398 illustrations. Scott, Foresman and Co., New York, 1940. $1.16

The ten communities are Williamsburg, New London, Atlanta, Brazonia, Waterloo, San Francisco, Seattle, Greeley, Gary and New York. They differ in their physical setting and in their historical development, but were alike in their efforts to provide the necessities of existence and growth for themselves. The factual materials are in many instances of slight worth, but their omission would make the complete picture of the settlement and growth of the communities less real. The authors hope that the stories will serve as types, and that they will spur pupils to work up similar accounts of the discovery, foundation, and development of their own particular localities.

The text is written for elementary school pupils but more adult minds may find in it suggestive materials and inspiration. The book is interesting as sporadic samples of achievement during different periods of the nation's history and under various environments, and should enhance the more generalized views of the history and geography of the United States. It makes intensely human the work, successes and failures, of our pioneers and carries their labors to fruition. The book is valuable also to the grade pupils and to the teachers as a type of method.

ROBERT M. BROWN

Rhode Island College of Education

J. Harlen Bretz. **Geology of the Chicago Region.** Part I—General. Bulletin No. 65, 118 pp. Illustrated. State Geological Survey, Urbana, Ill. 1939

This bulletin presents the results of the geological survey undertaken by Dr. Bretz and his assistants for the Illinois State Geological Survey. The material presented is on a level for schools and laymen. The physical setting of Chicago is described, mapped, and photographed. Geological changes now in progress made by air, water, and vegetation are analyzed, followed by the recounting of the changes wrought by glacial ice and glacial water erosion and deposition as noted in the unconsolidated and bed rock of greater Chicago.

W. H. Emmons. **The Principles of Economic Geology.** Second Edition. 529 pp. Illustrated. McGraw-Hill Book Co., N.Y. 1940. $4.00

The entire text has been reset and rewritten, and nearly all of the illustrations are new. The longer descriptions of the first edition have been reduced without sacrificing clarity due to the additions of many excellent maps and sections. The treatment and description of mining districts has been brought up to date. As in the first edition, the book is written in two parts, the first of which gives a general treatment of the processes operating in the formation of mineral deposits; and the second part gives a treatment separately of metals and nonmetals, except fuels.